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13. ABSTRACT

In support of the goals the Army Research Office (ARO) and to further scientific understanding, the Microwave Remote Sensing Laboratory at the University of Massachusetts has a comprehensive database of normalized radar cross sections. This database was created with one specific goal in mind, to allow convenient access to radar cross section data for radar engineers. The File of Normalized Radar Cross Sections or FINRACS database has attained this goal through utilization of the World Wide Web. This grant has supported me and other MIRSL researchers in our endeavors to achieve the aforementioned goals.

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Archiving Millimeter-wave Polarimetric Data with the FINRACS (File of Normalized Radar Cross Sections) Database

Final Report

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August 14, 1998

U.S. Army Research Office

DAAH04-95-1-0599

University of Massachusetts

Statement of Problem

In support of the goals the Army Research Office (ARO) and to further scientific understanding, the Microwave Remote Sensing Laboratory at the University of Massachusetts has a comprehensive database of normalized radar cross sections. This database was created with one specific goal in mind, to allow convenient access to radar cross section data for radar engineers. The File of Normalized Radar Cross Sections or FINRACS database has attained this goal through utilization of the World Wide Web. This grant has supported me and other MIRSL researchers in our endeavors to achieve the aforementioned goals.

Summary of Results

From 1984 to 1987 the University of Massachusetts compiled a large database of radar cross section data, called the File of Normalized Radar Cross Sections or FINRACS. The database was searchable and allowed users to display the data in graphical form. The database consisted of published data from UHF to mm-Wave frequencies. It included a variety of terrain types, such as snow, grass, asphalt, crops, and soil. As polarimetric measurements began to be made in the early 1990's, the FINRACS database was modified to display polarimetric data, in the form of a polarization signature for a Mueller matrix.

The use of FINRACS was limited by the nature of the program. The users

had to host the program on their own computer. The program was originally written for use on Digital DEC stations under VMS. It was updated in early 1994 for use on IBM compatible computers by MIRSL. This allowed many more users to access the database on their personal computers, but every update to the program or database, an update had to be distributed, either by diskette or by FTP.

The advent of the World Wide Web (WWW) and web browsing software such as Netscape, Mosaic, and Microsoft Internet Explorer triggered a change in the computing world. Data and program no longer needed to reside on the user's computer. A user could search for data on the world wide web. Data mining is an appropriate term.

The new version of FINRACS, known as FINRACS-WWW, took advantage of this information-age capability. Written in Hypertext Markup Language (HTML), the FINRACS-WWW interface is a web page that allows the user to specify search criteria. The user's request tells the HTTP server to run a program to perform a search. This program and the HTTP server are run on a MIRSL computer.
FINRACS is located at `http://acadia.ecs.umass.edu/finracs.html`.

This search program finds relevant matches between the data and the search criteria and forms a list of relevant files. It then takes this list, forms a HTML page from it, and gives it to the HTTP server. The HTTP server then serves this page to the user.

The user then selects a file of interest and clicks display. This request tells the HTTP server to get that file and use its data to generate a plot in GIF format which is incorporated into a HTML page as an inline image. This page is served to the user and allows for modification of the plot. Using this page, users can plot the data for a different range of values on both the x- and y-axes. The user can also add several theoretical model curve fits to the data. The program now supports the following fits:

- Linear Fit
- Order n Polynomial Fit
- Exponential Fit
- Gaussian Fit
- Rayleigh Model
- Clapp Model

An effort was made to include more data to the existing database. As a part of this goal, forward-scatter radar cross section data collected in 1997 and 1998 under ARO grant DAAH 04-96-1-0043 was included.

Participating Scientific Personnel and Advanced Degrees Earned

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Jeffrey M. Baker, Ph.D. expected September 1998

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